KF 2 ICS
Transmitted Light Microscope

Operating Manual

Knowledge of this manual is required for the operation of the instrument. Would you therefore please make yourself familiar with the contents of this manual and pay special attention to hints concerning the safe operation of the instrument.

The specifications are subject to change; the manual is not covered by an update service.

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CONTENTS

		Page
	INTRODUCTION	**I**
	Title page	I
	Copyright	II
	Contents	III
	Notes on instrument safety	IV
	Notes on warranty	V
	Overall view	VI
1	**DESCRIPTION**	**1-3**
1.1	Terms, intended use	1-3
1.2	Instrument description	1-3
1.3	Modules	1-4
1.4	Technical data	1-6
2	**START-UP**	**2-3**
2.1	Installation of the instrument	2-3
3	**OPERATION**	**3-3**
3.1	Objective selection	3-3
3.2	Visual overall magnification	3-4
3.3	Eyepiece reticles	3-4
3.4	Setting the microscope in brightfield	3-6
3.5	Setting the microscope for phase contrast	3-8
3.6	Setting the microscope in darkfield	3-10
3.7	Photomicrography	3-11
3.8	Videomicroscopy	3-12
3.9	illumination via mirror and condensor 0.9 AS	3-12
4	**CARE, MAINTENANCE AND TROUBLESHOOTING**	**4-3**
4.1	Care and maintenance of the instrument	4-3
4.2	Troubleshooting and requesting service	4-4
	ANNEX	**A-1**
	List of abbreviations	A-3
	Physical and technical units	A-4
	EC conformity declaration	A-5
	Certification in accordance with DIN EN ISO 9001 / DIN EN 46001	A-7

Notes on instrument safety

The KF 2 ICS microscope, including its original accessories, may only be used for the microscope applications described in this manual.

The manufacturer cannot assume any liability for any other applications, possibly also involving individual modules or single parts. This also applies to all service or repair work which is not carried out by authorized service personnel. Furthermore, all guarantee/warranty claims also expire for all those parts which were not directly affected by the repair.

Particular attention must be paid to the following warning notes:

The KF 2 ICS microscope was designed, produced and tested in compliance with DIN EN 61010-1 (IEC 1010-1), Safety requirements for electrical measuring, control and laboratory instruments, and meets the requirements of appendix I of directive 73/23/EC and the relevant CSA and UL directives. The instrument meets the requirements of the EC directive 89/336/EC and the EMC legislation of November 9th 1992. This operation manual includes information and warnings which must be observed by the user.

The KF 2 ICS microscope is categorized as Protection Class I and has been allocated the protection degree IP 20. The power plug must be inserted in a properly installed socket featuring a grounding contact. The grounding effect must not be made ineffective by an extension cable which does not have a protective ground wire.

Before switching on the instrument, check whether it is suitable for the line voltage present. The voltage is indicated on the underside of the microscope stand. Incorrect voltage settings can destroy the instrument.

If it is established that the protection measures are no longer effective, the instrument must be switched off and safeguarded against inadvertent operation. For the repair of the KF 2 ICS microscope, please contact the Carl Zeiss Microscopy Service in Germany (see page 4-6) or your local Carl Zeiss agency.

Dust and dirt can impair the performance of the KF 2 ICS microscope. Therefore, protect the instrument against these influences as far as possible. If the microscope will not be used for longer periods of time (more than 6 hours), it must be protected using the dust cover.

The instrument must be operated by trained personnel only, who must be aware of the possible danger involved with microscopy and the relevant application.

The KF 2 ICS microscope is an optical precision instrument which can be impaired in its performance or damaged when handled improperly.

All repairs inside the instrument may only be performed by the Carl Zeiss Microscopy Service in Germany (see page 4-6) or your local Carl Zeiss agency.

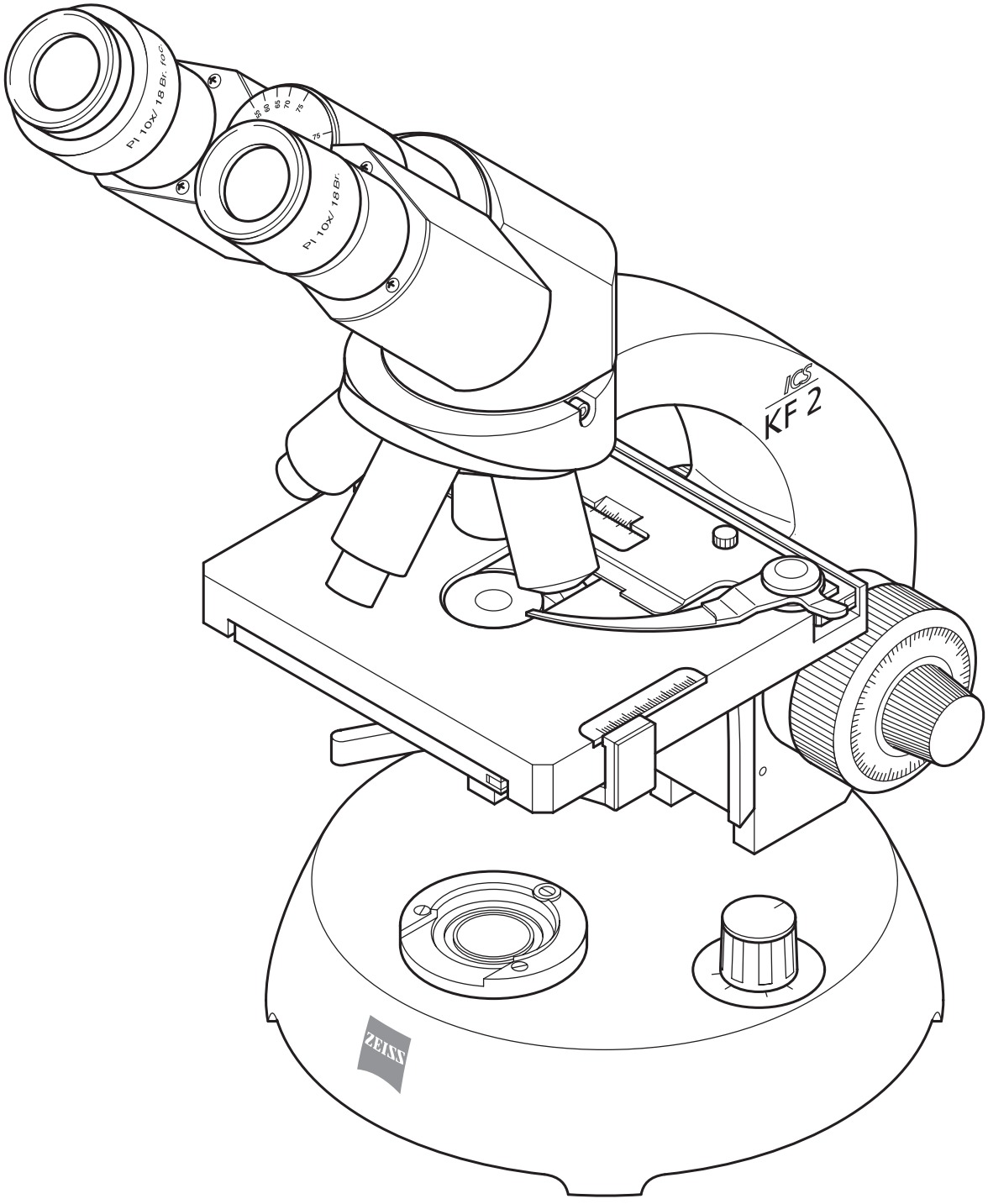
Notes on warranty:

The manufacturer guarantees that the instrument has no material and production defects when delivered. You must inform us of any defects immediately and we must do anything to minimize the damage. If the manufacturer is informed of such a defect, he is obliged to remove it; it is his decision whether he does this by repairing the instrument or by delivering an instrument free of any defect. No guarantee is provided for defects caused by natural wear (wearing parts in particular).

The instrument manufacturer is not liable for damage caused by faulty operation, negligence or any other meddling with the instrument, or the use of accessories from other manufacturers. This forfeits all the claims against warranty.

With the exception of the work specified in this manual, no maintenance or repair of the KF 2 ICS may be performed. Repairs may only be performed by Carl Zeiss Microscopy Service staff or specially authorized personnel. Should any defect occur with the instrument, please contact the Carl Zeiss Microscopy Service in Germany (see page 4-6) or your local Carl Zeiss agency..

Overall view of the KF 2 ICS microscope



DESCRIPTION

Contents

1 DESCRIPTION 1-3
1.1 Terms, intended use 1-3
1.2 Instrument description 1-3
1.3 Modules 1-4
1.4 Technical data 1-6

List of illustrations

Fig. 1-1 KF 2 ICS microscope equipment 1-4

1 DESCRIPTION

1.1 Terms, intended use

Manufacturer's name: KF 2 ICS microscope

The KF 2 ICS microscope is a universal microscope for the visualization of fine structures and forms in biology and medicine. These are typical application fields of this microscope:

- Schools, universities
- Medicine (for diagnosis)
- Quality inspection

1.2 Instrument Description

The KF 2 ICS microscope is a small, compact instrument which permits high-performance transmitted-light microscopy at little effort.

Major features:

- Sturdy, compact stand
- Coaxial coarse and fine drive
- Microscope stage with optional stand configuration:
- Fixed stage with spring clamps or mechanical stage 75 × 25 with specimen holder L or mechanical stage 75 × 25 with specimen holder R
- Condenser 0.9 AS with aperture diaphragm for low-power observation
- 4-position nosepiece with W 0.8 thread
- ICS objectives
- Binocular tube 45°/20 ICS
- Built-in illuminator with 6V 10W halogen lamp
- Power unit with integrated, stabilized power supply
- 12 V battery operation on request
- Illumination using external light source possible via mirror

1.3 Modules

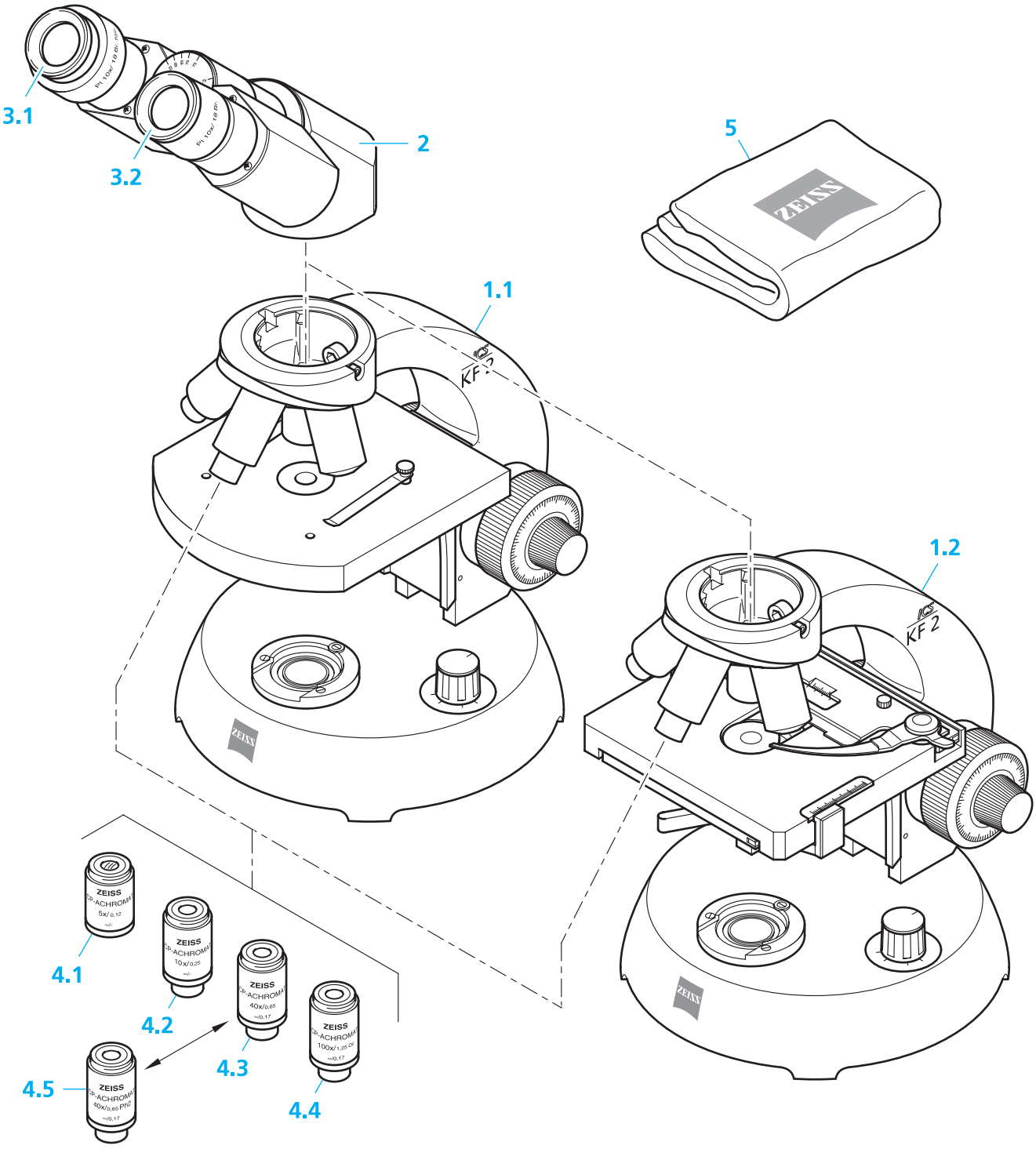


Fig. 1-1 KF 2 ICS microscope equipment

KF 2 ICS microscope equipment		**Cat. No.**
	KF 2 ICS microscope stand with 4-position W 0.8 nosepiece, condenser 0.9 AS with aperture diaphragm and additional lens for low-power observation, built-in illuminator, stabilized power supply, power cable with safety plug or American flat plug, 2 halogen lamps 6V/10W and instrument protection cover.	
1.1	KF 2 ICS stand equipment with fixed stage and 2 spring clamps (230 V) KF 2 ICS stand equipment with fixed stage and 2 spring clamps (115 V)	450719-9901-000 450720-9901-000
1.2	KF 2 ICS stand equipment with mechanical stage 75 × 25 L and specimen holder with spring clip R (230 V) KF 2 ICS stand equipment with mechanical stage 75 × 25 L and specimen holder with spring clip R (115 V)	450713-9901-000 450714-9901-000
2	Binocular tube 45°/20 ICS	452928-0000-000
3.1	Eyepiece PL 10×/18 Br. foc.	444132-9901-000
3.2	Eyepiece PL 10×/18 Br.	444131-9901-000
4.1	CP-"Achromat" objective 5×/0.12	440920-0000-000
4.2	CP-"Achromat" objective 10×/0.25	440930-0000-000
4.3	CP-"Achromat" objective 40×/0.65	440950-0000-000
4.4	CP-"Achromat" objective 100×/1.25 Oil	440980-0000-000
4.5	CP-"Achromat" objective 40×/0.65 Ph 2 (alternative to 440950) Ph 2 equipment Diopter d = 30 mm	440951-0000-000 465214-0000-000 444020-0000-000
5	Instrument protection cover	

1.4 Technical Data

(1) Dimensions

Dimensions (width × depth × height) ..... 185 × 185 × 400 mm

(2) Weight

Stand equipment ..... approx. 3 kg
Binocular tube 45°/20 ICS ..... approx. 1 kg
KF 2 ICS microscope, complete ..... approx. 5 kg

(3) Ambient conditions

Storage and transport (in packaging):

Permissible ambient temperature ..... -40 to +70° C
Permissible relative humidity (without condensation) ..... max. 100 %

Operation:

Permissible ambient temperature ..... +10 to +40° C
Permissible relative humidity (without condensation) ..... max. 90 %

(4) Operating data

Category of use ..... closed rooms
Protection class ..... SK 1
Protection degree ..... IP 20
Electrical safety ..... in compliance with DIN EN 61010 (IEC 1010-1) including CSA and UL directives
Pollution degree 2
Excess voltage category II
Radio interference suppression ..... in accordance with EN 55011, Class B
Line voltage ..... 100 to 127 VAC (±10%) or 220 to 240 VAC (±10%)
Line frequency ..... 50/60 Hz
Label of voltage range ..... on instrument underside
max. power consumption ..... 35 VA
battery supply voltage ..... 12 V DC

(5) Light source

Built-in illuminator system with halogen lamp ..... 6 V, 10W
Lamp voltage (variable) ..... 0 to max. 6 V

(6) Opto-mechanical data

Stand with objective focusing ..... coaxial coarse (fine drive, lift: 15 mm coarse drive: 1 rotation = 4 mm, fine drive: step-down ratio 1:10
Objective change ..... manually via 4-position nosepiece W 0.8"
Largest possible eyepiece field ..... 20 mm
Largest possible object field ..... 5 mm
Binocular tube ..... interpupillary distance can be set between 55 and 75 mm

START-UP

Contents

2 START-UP 2-3
2.1 Installation of the instrument 2-3

List of illustrations

Fig. 2-1 Attachment of binocular tube 2-3
Fig. 2-2 Positions of binocular tube 2-3
Fig. 2-3 Screwing in objectives 2-4
Fig. 2-4 Attachment of eyepieces 2-4
Fig. 2-5 Switch on line operation mode 2-5
Fig. 2-6 Switch on line/battery operation mode 2-6

2 START-UP

2.1 Installation of the instrument

The KF 2 ICS microscope, including accessories, is delivered in standard packaging. We would recommend you to keep the packaging material so that the instrument can be stored for a longer period of time or returned to the manufacturer.

(1) Preparations

Remove the microscope from the transport case and place it on the worktable.

(2) Attachment of binocular tube 45°/20 ICS

Loosen hexagonal screw (2-1/**2**) using the SW 3 ball-headed screwdriver. Slightly incline the tube (2-1/**1**) and insert it into the stand via its dovetail. Turn the tube in the required observation position and tighten the hexagonal screw.

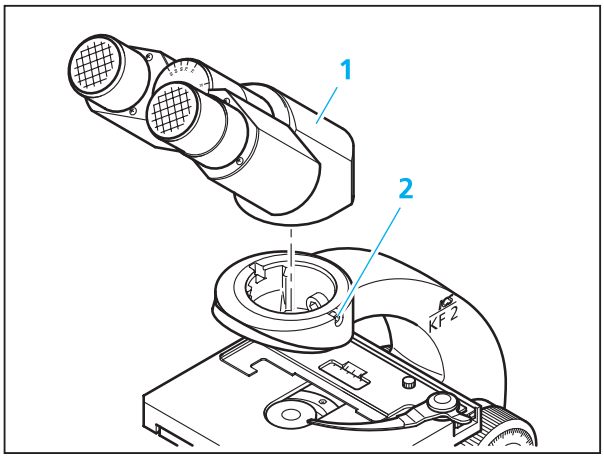


Fig. 2-1 Attachment of binocular tube

- The eyepiece distance is matched to the individual interpupillary distance by swinging the eyepiece tubes symmetrically towards one another.
- A higher (2-2/**A**) or lower (2-2/**B**) viewing height is achieved by swiveling the tube.

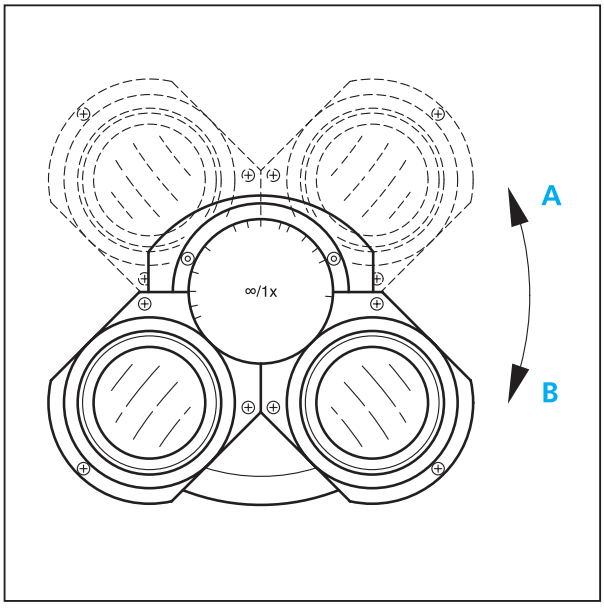


Fig. 2-2 Positions of the binocular tube

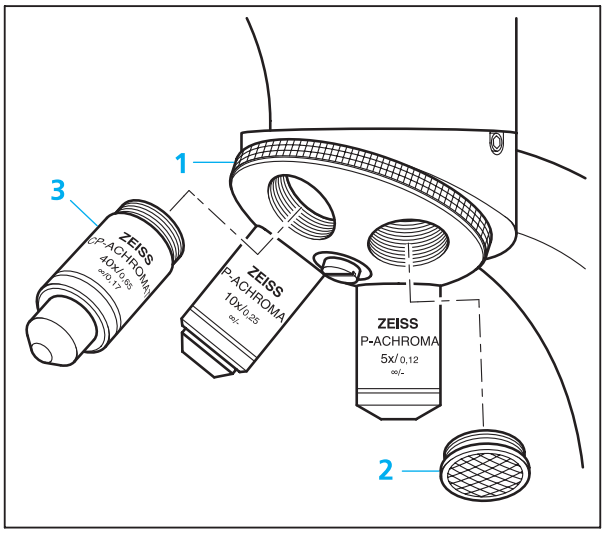


Fig. 2-3 Screwing in objectives

(3) Screwing in objectives

Remove dust caps (2-2/**2**) according to the number of objectives and screw objectives (2-2/**3**) in nosepiece clockwise one by one, starting with the lowest magnification.

Nosepiece eyes which are not required should be closed with dust caps.

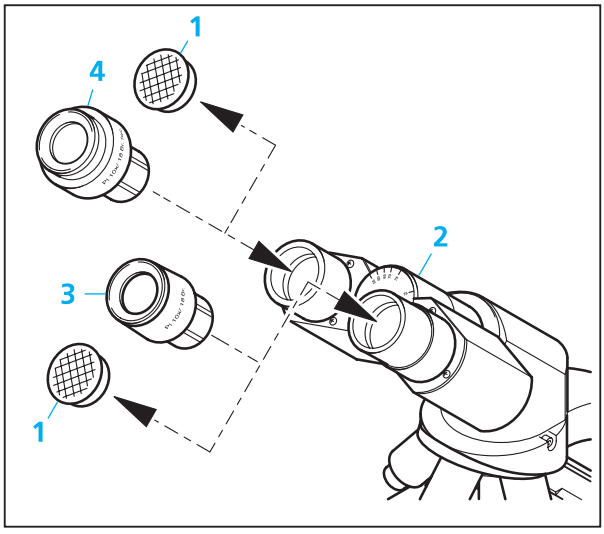


Fig. 2-4 Inserting the eyepieces

(4) Inserting the eyepieces

- Remove both protection caps (2-4/**1**) from the binocular tube (2-4/**2**).
- Insert the fixed eyepiece PL 10x/18 Br. (2-4/**3**) in the right tube and the focusing eyepiece PL 10x/18 Br. foc. (2-4/**4**) in the left tube.

The focusing eyepiece is used to compensate for myopia of both eyes.

(5) Switching on the line and line/battery modes

The illumination system of the KF 2 ICS has been designed for operation using a power unit, but is also available for line/battery operation on request. Subsequent conversion from line operation to line/battery operation is not possible.

View the type label (4-2/**2**) to check whether the built-in lamp supply complies with the present line voltage.

Should the line voltage not lie within the range of the built-in lamp supply, please get in touch with the nearest Carl Zeiss agency.

a) Switch on line operation

- Connect instrument to the power plug via the power cable.
- Set the required brightness via the control (2-5/**2**).
- Depending on requirements, place attenuation filter or conversion filter on support (2-5/**3**).
- Swing required objective (2-5/**1**) in the beam path.

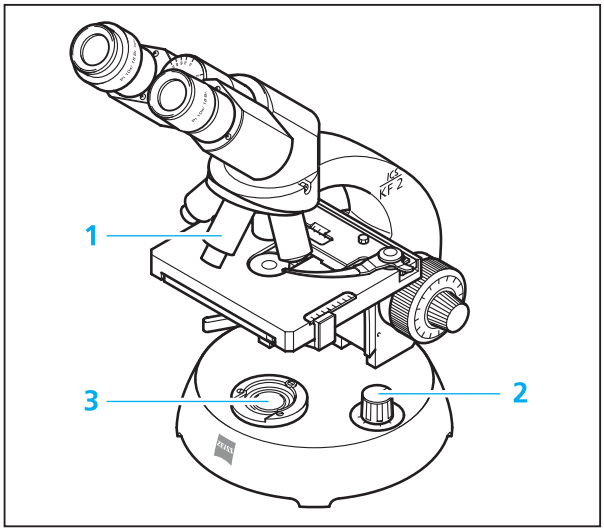


Fig. 2-5 Switching on the line operation

b) Switch on the line/battery operation

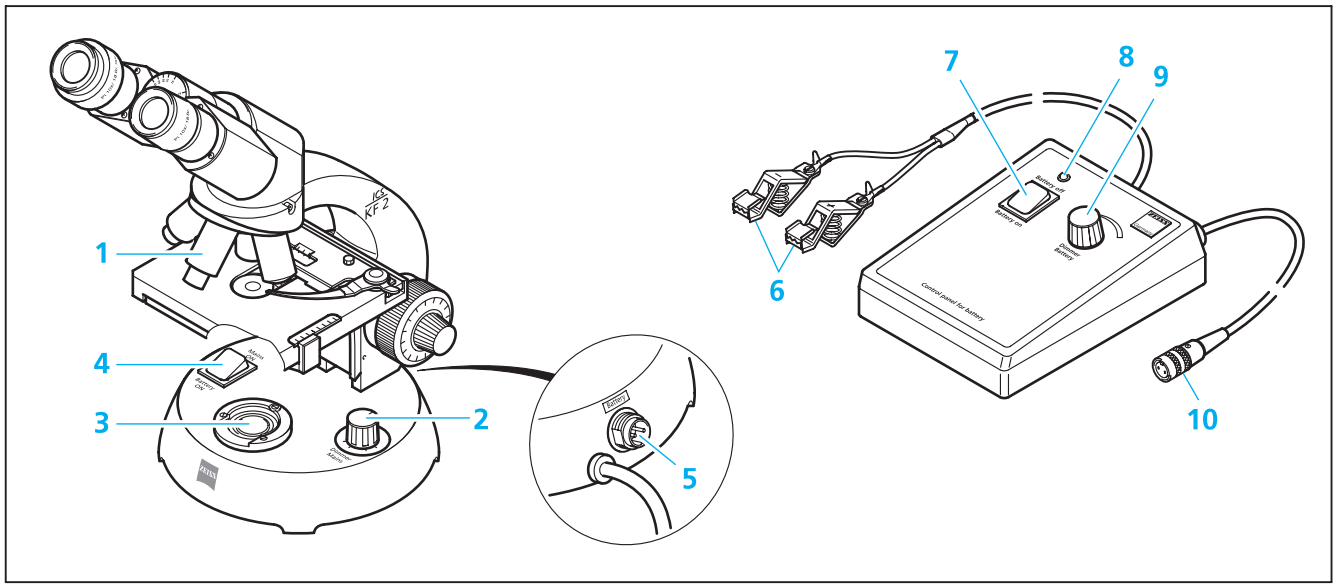


Fig. 2-5 Switching on the line/battery operation

- Line operation
  - Connect KF 2 ICS to line plug via line cable.
  - Set switch (2-6/**4**) to "Mains ON".
  - Set the required brightness using the "Dimmer Mains" control (2-6/**2**).
- Battery operation:
  - Connect plug (2-6/**10**) of the "Control panel for battery" to socket (2-6/**5**).
  - Set switch (2-6/**4**) on the Standard KF 2 ICS in position "Battery ON".
  - Set switch (2-6/**7**) on the "Control panel for battery" in position "Battery off".
  - Connect "Control panel for battery" to car battery (12 V DC) via connection clamps (2-6/**6**).

    Note the correct polarity of the connection clamps!
  - Set switch (2-6/**7**) on the "Control panel for battery" in position "Battery on".
  - The green LED (2-6/**8**) lights up.
  - Set the required brightness using the "Dimmer Battery" control (2-6/**9**).
- Depending on requirements, place attenuation filter or conversion filter on support (2-6/**3**).
- Swing required objective (2-6/**1**) in the beam path.

OPERATION

Contents

3	**OPERATION**	**3-3**
3.1	Objective selection	3-3
3.2	Visual overall magnification	3-4
3.3	Eyepiece reticles	3-4
3.4	Setting the microscope in brightfield	3-6
3.5	Setting the microscope for phase contrast	3-8
3.6	Setting the microscope in darkfield	3-10
3.7	Photomicrography	3-11
3.8	Videomicroscopy	3-12
3.9	Illumination via mirror and condenser 0.9 AS	3-12

List of illustrations

Fig. 3-1	Inserting an eyepiece reticle	3-4
Fig. 3-2	Setting the condenser lever	3-6
Fig. 3-3	Setting the microscope in brightfield	3-7
Fig. 3-4	Setting the microscope for phase contrast	3-8
Fig. 3-5	Setting the Ph rings via diopter or auxiliary microscope	3-8
Fig. 3-6	Illustration of the phase stop setting	3-9
Fig. 3-7	Setting the microscope in darkfield	3-10
Fig. 3-8	Attaching a SLR camera (CONTAX 167 MT)	3-11
Fig. 3-9	Illumination via mirror and condenser 0.9 AS	3-12

3 OPERATION

3.1 Choice of objectives

The objectives are the centerpiece of the microscope. The following is an example of how objectives can be labeled:

CP-"Achromat" 10×/0.25 ∞/-

where

10×	=	objective magnification
0.25	=	numerical aperture
∞	=	infinite tube length
-	=	usable for covered and uncovered specimens

or

0.17	=	only for covered specimens with a cover slip thickness of 0.17 mm

The objective magnification multiplied with the eyepiece magnification (minimum 10x) results in the visual overall magnification: e.g. 10 × 10 = 100×.

The numerical aperture × 1000, e.g. 0.25 × 1000 = 250, is the highest useful magnification, i.e. no further details are resolved above that limit.

The "∞"sign means that these objectives cannot be used with microscopes the objectives of which are labeled with "160" for the mechanical tube length.

3.2 Visual overall magnification

The M_M visual overall magnification of the microscope results from the multiplication of the M_{Obj} objective magnification with the $M_{eyep.}$ eyepiece magnification:

Example:

$M_{Obj} = 40\times$

$M_{eyep.} = 10\times$

$M_M = 40 \times 10 = 400\times$

3.3 Eyepiece reticles

The 40× objective mentioned in the example under 3.2 produces an intermediate image of the object with the magnification 40 : 1.

For quantitative assessment, this intermediate image can be superimposed with an eyepiece reticle, where both the intermediate image and the eyepiece reticle are viewed through the focusing eyepiece.

(1) Inserting the eyepiece reticle (∅ 26 mm)

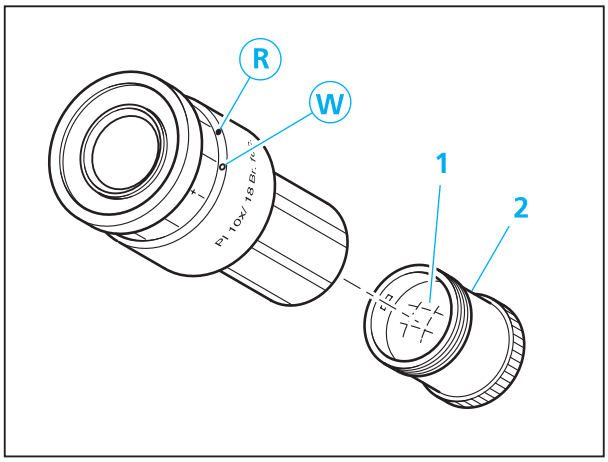


Fig. 3-1 Inserting an eyepiece reticle

- The eyepieces PL 10×/18 Br. foc. have been designed for use with eyepiece reticles.
- The slight image shift caused by the additional path through the glass is taken into account on the diopter scale by the fact that the zero point position is indicated not by the white dot **W** but by the red dot **R**.
- The eyepiece reticles (3-1/**1**) have been adhered to screw-in mounts (3-1/**2**) by the manufacturer to allow easy replacement.
- To replace a reticle, unscrew the screw-on mount or the part containing the eyepiece reticle and replace it with the required one.

If eyepiece reticles are inserted into the unscrewed mount by the customer, attention must be paid to the labeling being visible the right way up after insertion.

(2) Compensating for myopia

Two focusing eyepieces PL 10×/18 Br. foc. are required to allow the user to compensate for differences in the visual performance of his two eyes.

- Use the eyelens of the focusing eyepiece to focus on the line figure of the eyepiece reticle; focus on the edge of the field of view if no eyepiece reticle is used.
- Focus on the microscope image of a specimen via the focusing drive by looking through the eyepiece with reticle.
- When the image and the eyepiece reticle are in focus in the above eyepiece, focus the image for the second eye via the eyelens of the second eyepiece.

The position of the focusing drive on the stand must not be changed.

3.4 Setting the microscope in brightfield

- Place specimen on the sample stage with the cover slip pointing upwards.

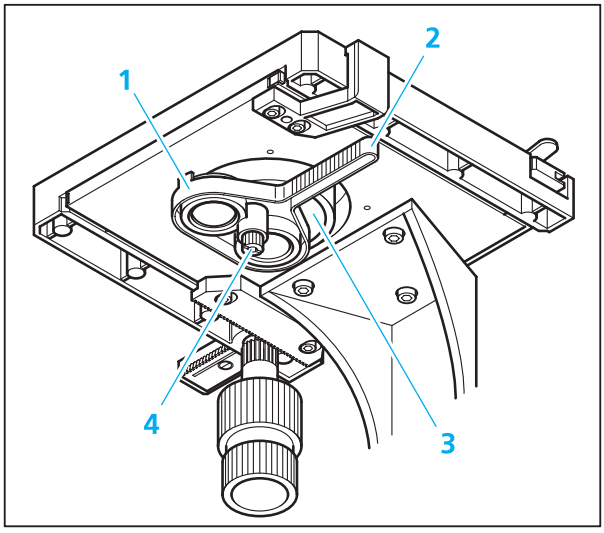


Fig. 3-2 Setting the condenser lever

- The condenser 0.9 AS (3-2/**3**) is aligned with the specimen stage and firmly attached to it. It contains an aperture diaphragm to control the image contrast. The condenser lever (3-2/**1**) is attached to the bottom of the condenser via a knurled knob (3-2/**4**).
- Swing in the 10x objective. When using an objective with magnification 10× or higher, switch the condenser lever (3-2/**1**) to free passage by turning the lever (3-2/**2**) to the right until stop.

The condenser lever (3-2/**1**) can be switched in two stop positions:

- Lever (3-2/**2**) to the right:
  - free passage (to be used for objectives ≥ 10×).
- Lever (3-2/**2**) to the left:
  - additional lens swung in (to be used for objectives < 10×).

The aperture diaphragm can also be set to both stop positions via the lever (3-2/**2**).

- Turning to the right within the stop position:
  - aperture diaphragm is opened
- Turning to the left within the stop position:
  - aperture diaphragm is closed.

- Look through the fixed eyepiece of the binocular tube first and focus on the object via the focusing drive (3-3/**2**). Then set the focus for the other eye by turning the eyelens of the focusing eyepiece (3-3/**1**). Set the distance of the tubes in such a way that you can see a sharply limited field of view with both eyes.
- Control the image contrast and the resolving power via the condenser (aperture) stop using the lever (3-2/**2**). Remove an eyepiece from the tube for checking. Look through the empty tube. Approx. 2/3 of the diameter of the visible objective aperture should be illuminated through the condenser stop. When changing the objective, be sure to match the aperture diaphragm to the objective opening.
- Adjust image brightness using control (3-3/**3**) or filters on the mount (3-3/**4**).

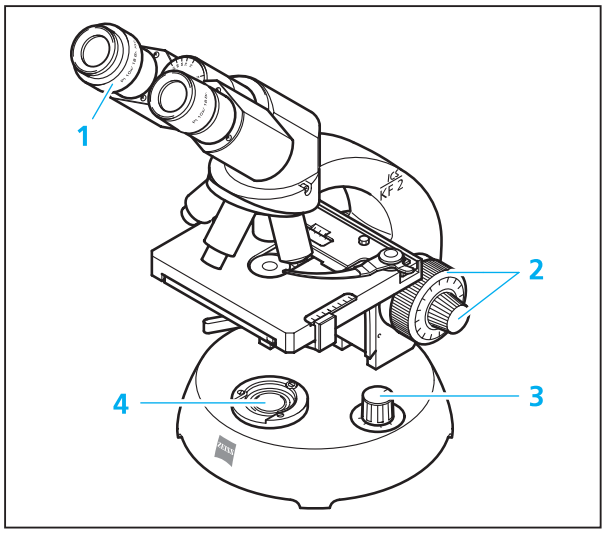


Fig. 3-3 **Setting the microscope in bright-field**

- When using objectives with a low magnification (< 10×), swing the additional lens in the light path using the lever (3-2/**2**) and open the condenser stop until it disappears behind the edge of the field of view.
- When using immersion objectives, e.g. CP Achromat 100×/1.25 oil, always apply a drop of immersion oil between the objective front lens and the specimen. For this, special immersion oil, which guarantees the full performance of the objective, is supplied in an oiler. Make sure that there are no bubbles between the specimen and the objective front lens, since this would reduce the image quality.

Do not immerse the condenser front lens.

- The objective mount of the immersion objectives can be locked by lifting and slightly turning it so that the immersion objective can be swung in and out without touching an immersed cover slip. This prevents the front lenses of dry objectives from dirt.

3.5 Setting the microscope for phase contrast

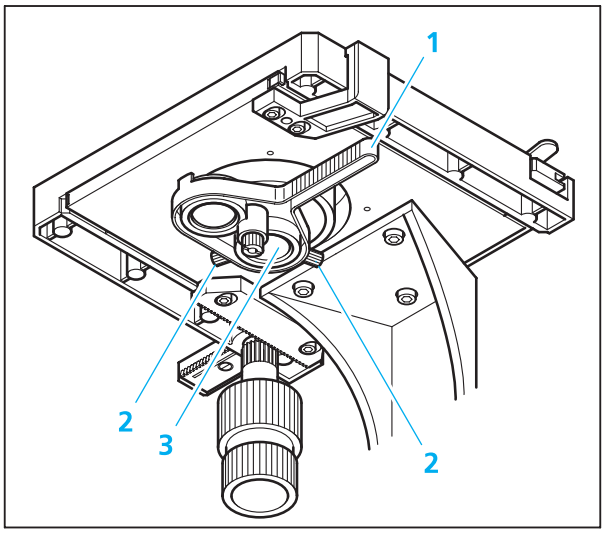


Fig. 3-4 **Setting the microscope for phase contrast**

- The condenser lever (3-2/**1**) can be exchanged for a condenser lever with phase stop Ph 2 (46 52 14) (3-4/**3**).
  For this, unscrew the knurled knob (3-2/**4**), pull out the changer in downward direction, slide in the new changer until stop and fix it via the knurled knob.
- Set the object in brightfield first. Switch the lever (3-4/**1**) in the left position (free passage) and then move the aperture diaphragm to the right until it has a suitable opening (also see section 3.4).
- Swing in phase stop Ph 2 (3-4/**3**) by switching the lever (3-4/**1**) in the right position. The aperture diaphragm opens automatically.
- Swing a phase contrast objective, e.g. CP Achromat 40×/0.65 Ph 2, in the light path.

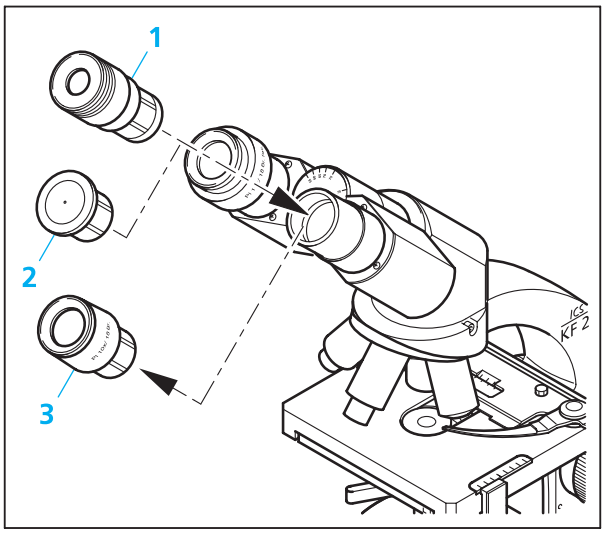


Fig. 3-5 **Setting the Ph rings via diopter or centering telescope**

Centering the phase stop Ph 2 in relation to the objective Ph 2.

- Insert the diopter (3-5/**2**) into the tube instead of an eyepiece (3-5/**3**).

- Turn the screws (3-4/**2**) to superimpose the dark Ph ring on the bright ring. The dark phase ring of the objective must fully cover the bright illumination ring.
  A centering telescope (3-5/**1**) can also be inserted into the tube instead of a diopter. If a centering telescope is used, its eyelens must be shifted until the illuminating ring is in focus.
- Insert the eyepiece (3-5/**3**) in the tube again.
- Adjust the lamp brightness via control (3-3/**3**).
- If required, place a green filter on the filter mount (3-3/**4**) to enhance the contrast of the phase contrast image.

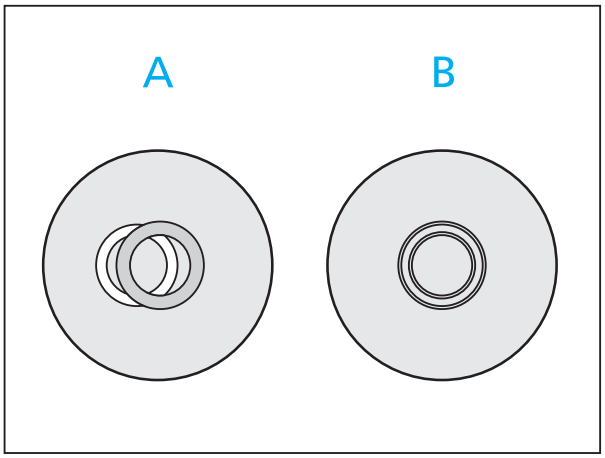


Fig. 3-6 **Illustration of the phase stop setting**

Optimum phase contrast requires extreme cleanliness! Therefore, clean the front lens of the objective used, the visible condenser surface, the upper cover slip surface and the lower carrier plate surface with particular care and make them free from grease.

3.6 Setting the microscope in darkfield

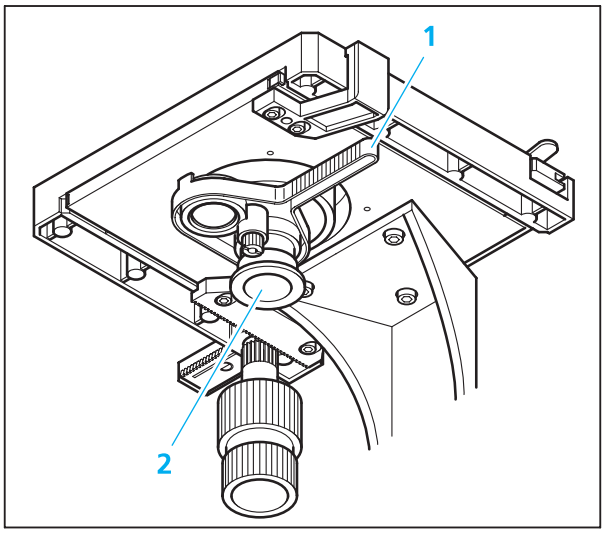


Fig. 3-7 Setting the microscope in darkfield

- The condenser lever (3-2/**1**) can be exchanged for a condenser lever with darkfield stop D 0.7) (3-7/**2**).
  For this, unscrew the knurled knob (3-2/**4**), pull out the changer in downward direction, slide in the new changer until stop and fix it via the knurled knob.
- Set the object in brightfield first. Switch the lever (3-7/**1**) in the left position (free passage) and then move the aperture diaphragm to the right until it has a suitable opening (also see section 3.4). For focusing, search for an object spot featuring minimum structure (if need be, a spot at the edge of the specimen).
- Swing in darkfield stop Ph 2 (3-7/**2**) by switching the lever (3-7/**1**) in the right position. The aperture diaphragm opens automatically.
  To optimize the darkfield setting, the darkfield stop (3-7/**2**) can be adjusted in height until the object appears as bright as possible and the background as dark as possible.
- Set maximum brightness via control (3-3/**3**).

Optimum darkfield requires extreme cleanliness. Therefore, clean the front lens of the objective used, the visible condenser surface, the upper cover slip surface and the lower carrier plate surface with particular care and make them free from grease.

3.7 Photomicrography

The KF 2 ICS microscope (with phototube) can be changed from observation to photography via the pushrod (3-8/**7**). Special connectors and the T 2 adapter allow commercially available 35 mm SLR cameras and special microscope cameras (e.g. MC 80 DX) to be attached to the camera port of the KF 2 ICS. For the use of the photomicrography equipment, please observe the relevant separate manuals in addition to the information provided in this manual.

Assembly (e.g. CONTAX 167 MT)

- Screw the T 2 adapter of the camera used on the connector 2.5× for T 2 (3-8/**4**).
- Attach the camera and fix the cable release (3-8/**1**), if required.
- Loosen the three hexagonal screws (3-8/**6**), remove the dust cover (3-8/**8**) from the phototube (3-8/**5**) and insert the premounted unit A in the phototube.
- Align the unit in the required position and tighten the three hexagonal screws (3-8/**6**).

If focusing is not to be made via the viewfinder of the camera, the component with the photo reticle must be screwed in the eyepieces (also see section 3.3).

For detailed information on SLR cameras please see manual G 42-406/II entitled "35 mm SLR cameras for microscopes and stereo-microscopes".

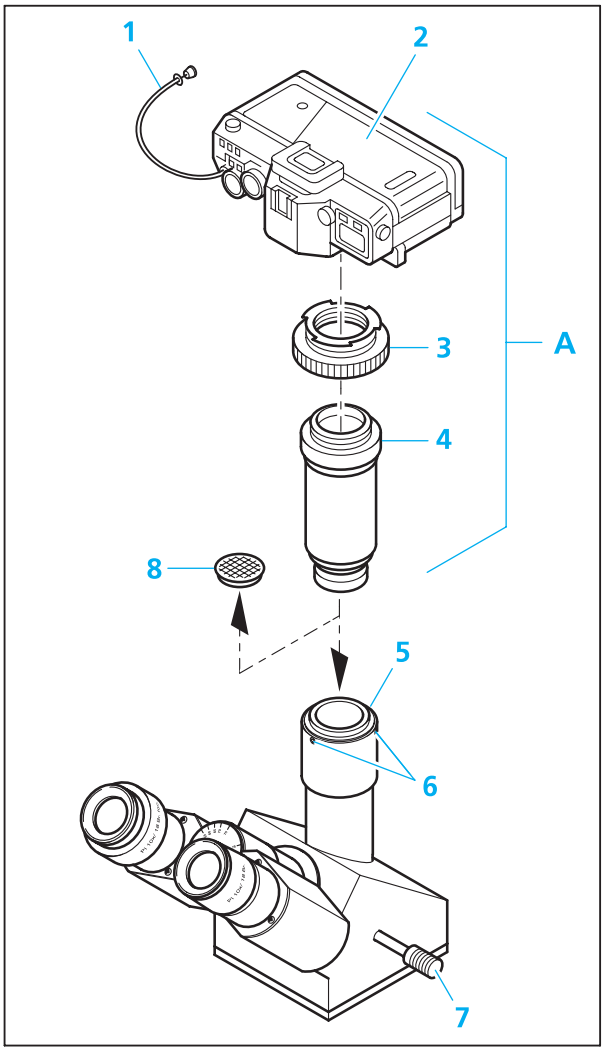


Fig. 3-8 **Assembly of a SLR camera (CONTAX 167 MT)**

3.8 Videomicroscopy

Various TV 60 adapters allow 1-chip black-and-white and color cameras to be attached to the KF 2 ICS with phototube.

3.9 Illumination via mirror and condenser 0.9 AS

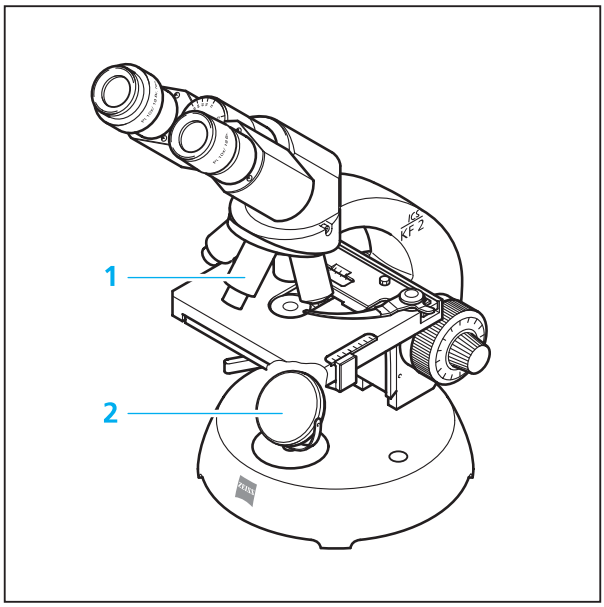


Fig. 3-9 Illumination via mirror and condenser 0.9 AS

- Align (turn and tilt) the flatfield surface of the illumination mirror (3-9/**2**) until diffuse daylight or the light of a separate lamp illuminates the specimen homogeneously.
- Adjust the object as described under "brightfield".
- Swing required objective (3-9/**1**) in the beam path.

CARE, MAINTENANCE AND TROUBLESHOOTING

Contents

4 CARE, MAINTENANCE AND TROUBLESHOOTING 4-3
4.1 Care and maintenance of the instrument 4-3
4.2 Troubleshooting and requesting service 4-4

List of illustrations

Fig. 4-1 Changing the fuse for line/battery operation 4-4
Fig. 4-2 Changing the halogen lamp 4-5
Fig. 4-3 Adjusting the lamp coil 4-5

4 CARE, MAINTENANCE AND TROUBLESHOOTING

4.1 Care and maintenance of the instrument

Maintenance of the KF 2 ICS is limited to the following operations:

- Cover the instrument with the dust cover after every use.
- Do not install instrument in a damp room.
- Remove dust from optical surfaces using a natural hair brush or a rubber blower.
- Remove stubborn dirt or fingerprints using commercially available optics cleaning cloths; if necessary slightly moisten the cloths with petroleum ether. Clean the front lenses of the objectives using petroleum ether, but do not use alcohol.

When using the KF 2 ICS in humid climatic zones, proceed as follows:

- Store the KF 2 ICS in bright, dry and well ventilated rooms with a humidity of less than 65%; store particularly sensitive components and accessories, such as objectives and eyepieces, in a dry closet.
- When the equipment is stored in closed cases for a longer period of time, the growth of fungus can be avoided by including cloths soaked in fungicide in the cases.

The risk of growth of fungus on opto-mechanical instruments always exists in the following conditions:

- Relative humidity of more than 75% and temperatures between +15° C and +35° C for more than three days.
- Installation in dark rooms without air ventilation.
- Dust deposits and fingerprints on optical surfaces.

4.2 Troubleshooting and requesting service

Troubleshooting on the KF 2 ICS is limited to only a few actions:

- Checking the line voltage
- Changing the fuses for line/battery operation
- Change and adjustment of the 6 V / 10 W halogen lamp.

(1) Checking the line voltage

- Make sure that the required line voltage is available.
- Check the line cable and plug for defects.
- If there are any visible defects or if the instrument does not function, have the lamp supply and the line cable exchanged by an expert.

(2) Changing the fuses for line/battery operation

The fuse holder at the rear of the "Control panel for battery" contains the T 4 A set of fuses.

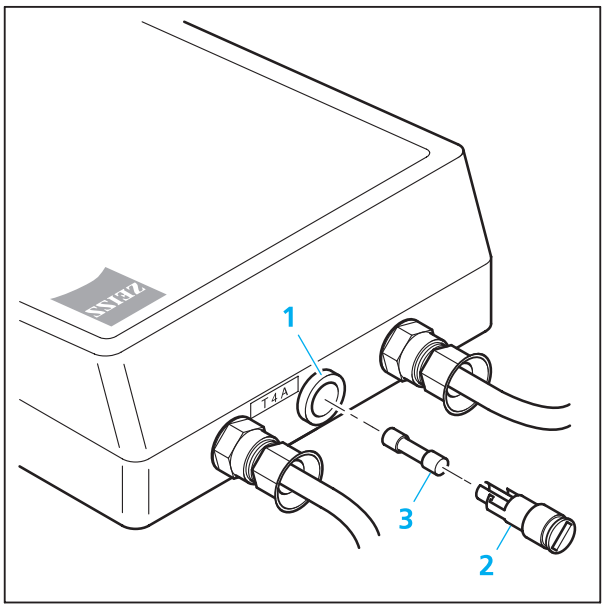


Fig. 4-1 Changing the fuses for line/battery operation

- Disconnect the instrument from the battery supply.
- Use a coin to unscrew the fuse holder (4-1/**2**) and remove it from the mount (4-1/**1**).
- Remove defective set of fuses (4-1/**3**) from the fuse holder (4-1/**2**).
- Replace defective set of fuses.
- Insert fuse holder in the mount (4-1/**1**) again and tighten the screws using a coin. While doing this, press against the spring of the fuse holder.

(3) Change and adjustment of the 6 V / 10 W halogen lamp.

- Place the microscope on its side on the table.
- Loosen the knurled screw (4-2/**1**) and pull out the illuminator (4-2/**4**).
- Remove the halogen lamp (4-3/**1**) from the metal clamps (4-3/**2**).
- Use the plastic protection bag supplied by the manufacturer to hold the lamp and insert the lamp in the metal clamps (4-3/**2**). Remove the fingerprints before switching on the lamp.

Adjusting the halogen lamp:

- For an exact adjustment, the lamp coil and its reflection image must be parallel to each other and be identical in size when looking on the lamp and concave mirror. To achieve this, loosen screw (4-2/**3**) and move halogen lamp with mount (4-3/**3**) until the required setting has been obtained.
- Retighten screw (4-2/**3**).
- Then turn screw (4-3/**4**) until the coil and its reflection image appear identical in size (Fig. 4-3/**6**). After adjustment, insert the lamp housing and tighten the knurled screw (4-2/**1**).

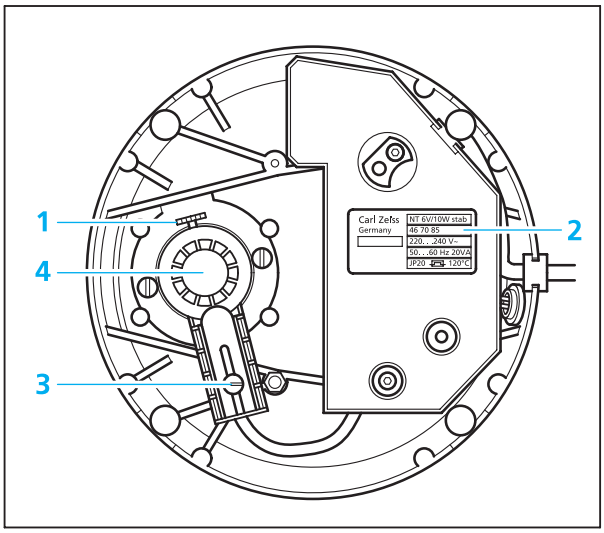


Fig. 4-2 Changing the halogen lamp

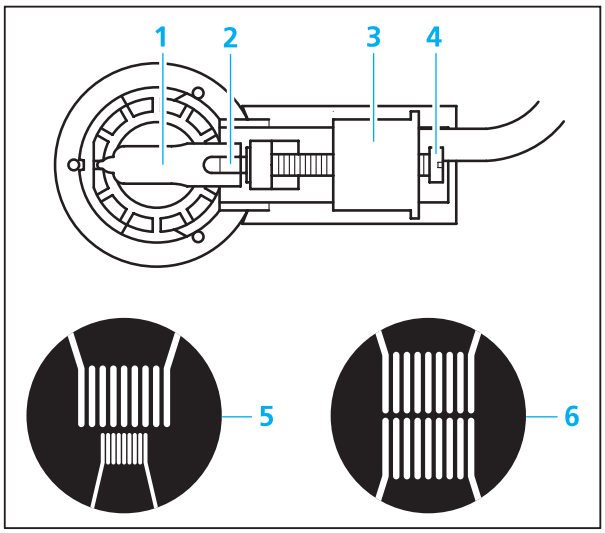


Fig.4-3 Adjusting the lamp coil

(4) Requesting service

All repairs of mechanical, optical or electronic components inside the instrument and of the electrical components of the KF 2 ICS may only be performed by Carl Zeiss service staff or specially **authorized** personnel.

To ensure the optimum setting and trouble-free function of your microscope even for a longer period of time, we would recommend you to conclude a service/maintenance contract with Carl Zeiss.

In the case of subsequent orders or when service is required, please get in touch with the Carl Zeiss Microscopy Service in Germany or your local Carl Zeiss agency.

The Carl Zeiss Microscopy Service in Germany can be reached at the following addresses:

Telephone: 0180 333 6333 (only available within Germany)
Fax: ++49-73 64 20-4939
e-mail: me-sd@zeiss.de

Further information is available under the following Internet address:

micro@zeiss.de

www.zeiss.de/micro

ANNEX

- List of abbreviations A-3
- Physical and technical units A-3
- EC conformity declaration A-5
- Certification in accordance with DIN EN ISO 9001 / DIN EN 46001 ..... A-7

List of abbreviations

AS	aspheric
Br.	for eyeglass wearers
CCD	Charge-Coupled Device
CSA	Canadian Standards Association
d	diameter
DC	direct current
DIN	German industrial standards
DX	coding system for the storage of electronically legible information, e.g. film speed
EEC	European Economic Community
EN	European standards
FAA	free working distance
foc.	focusing
ICS	Infinity Color corrected System
IEC	International Electrotechnical Commission
IP	International Protection (protection type)
KF	combination fine drive (coaxial drive)
L	left
MC	Microscope Camera
OZ	item number in figures
Ph 1, 2, 3	phase contrast 1, 2, 3
PL	flatfield
R	right
SK	protection class
SLR	Single Lens Reflex (camera)
SW	width of key wrench
S/W	black-and-white
T 2 adapter	standardized objective adapter
TV	television
UL	Underwriters Laboratories
VDE	Association of German Electrotechnicians
W 0.8“0.8“	Whitworth thread

Physical and technical units

°C	degree Centigrade (0°C = 32°F)
V	Volt
W	Watt
"	inch (1" = 25.4 mm)